

# FOOD COATING AND TOPPING APPLICATOR APPARATUS AND METHODS OF USE THEREOF

## CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) to U.S. Provisional Patent Application No. 60/940,247, filed May 25, 2007, and under 35 U.S.C. §120 to and is a continuation-in-part of U.S. patent application Ser. No. 11/396,202, filed Mar. 30, 2006 and claiming priority to U.S. Provisional Application Ser. No. 60/667,405 filed on Apr. 1, 2005, the entireties of both of which are incorporated by reference herein.

## FIELD OF THE INVENTION

The field of invention includes food coating, food topping, and food conveying equipment.

## BACKGROUND OF THE INVENTION

Prepared food products come in a wide variety of styles. Many prepared food products, whether ready-to-eat or those needing further cooking, are prepared with a coating that makes the food product more appealing. Such prepared food products include entrees, appetizers, desserts (such as pastries, donuts), etc., and includes meats, cheese, fruit and vegetables, etc. The types of coatings used on these food products include dry coatings such as flour, bread crumbs, corn meal, sugar and spice and the like. While the automation of the food coating process is economically desirable, another goal of the food coating process is to make the coating appear to be "home-made." However, most automatic food coating processes fail to make "home-style" appearing foods.

Prepared food products also include foods having one or more topping applied to one or more sides of the food product. Such prepared food products include pizzas, pretzels, fish or other meat patties, and the like. The types of toppings used on these food products include cheese, mushrooms, sausage, sugar and cinnamon, spices, breadings, salt, and the like.

Some food products have a batter applied to them before the coating or topping is applied. When a batter applicator is used before the coating or topping is applied, time is saved when both the batter applicator and the coating or topping run at the same or similar speed. This provides a continuous flow of food product during both processes.

In the commercial production of prepared foods, a large variety of food products are machine-coated with breading, flour or the like before being fried, (or otherwise cooked) or simply frozen and packaged. In the food preparation industry, food coatings are generally classified by appearance as flour breading, free flowing (such as cracker meal or bread crumbs), and Japanese-style crumbs which tend to be elongate and crispy. Food coatings may also include seasonings, spices, shortening, etc., as needed to add flavor and texture to the food product. Other coatings such as ground cereal, dried vegetables or the like may also be employed.

Each coating mixture has inherent characteristics that presents challenges to machinery used to automatically and mechanically coat food products. For example, flour mixtures, which consist of finely ground dust-like particles, have a tendency to pack under pressure thereby decreasing the free-flow properties of the coating mixture around the food product, which can decrease coating uniformity. Similarly, coating mixtures recognized as free-flowing include reason-

ably hard and roughly spherical particles ranging in size from dust to larger particles, such as cornmeal, cracker meal or the like. Free-flowing mixtures in automated coating processes can often flow or leak out of the machinery.

Japanese-style crumbs have no uniform shape, are very delicate, and are crystalline-like in nature and appearance. So, the coating machine should be able to properly handle this type of breading material to avoid degradation of the quality and particle sizes thereof. Japanese-style crumbs consist of modified wheat flour with small percentages of yeast, salt, sugar, vegetable oil and other additives. The Japanese style crumbs appear to be dried shredded white bread having particles ranging in size from as large as 1/2 inch to as small as flour size particles.

Generally, the food industry prefers to use an automated and continuous food coating process wherever possible while still achieving a "home-style" look. Continuous processes include: tumble drums and mesh belt processes. The tumble drum operation has a hollow drum or tumbling device that is fed with a coating mixture and food products, and it is rotated so that the food product is tumbled in the coating in a manner which causes the coating material to contact and adhere to the outer surfaces of the food. After a sufficient contacting time (generally determined by the size, speed of rotation and internal drum structure) the food items are discharged for further processing.

The drum coating also has its drawbacks. Principally, mechanical handling of the food items may be quite rigorous limiting its use to robust products. More delicate food items (such as fish) may not be suitable for drum processing.

Other types of food coating devices employ endless mesh belts. For example, U.S. Pat. No. 6,117,235 discloses a continuous coating and breading apparatus which includes a conveyor belt made of stainless steel mesh. The conveyor has various stations along its length. Food items are deposited on the belt at an infeed area and are coated with the coating mixture on the bottom surface. The conveyor belt carries the food items under a "waterfall" of food coating that covers the top surface of the food items. The conveyor passes under one or more pressure rolls that pat the coating mixture onto the food pieces, and/or a blow off device, removing excess coating. The coated food product is deposited at a discharge area. In commercial practice, such systems may employ as many as six conveying belts to spread the coating mixture and achieve acceptable consistent operation and performance.

Other types of food coating devices use multiple augers to distribute coatings and/or toppings to various parts of the device. Oftentimes, six or more augers or other conveying devices are used to spread coatings and/or toppings. This results in a complex device with numerous drives. These types of devices are also difficult to clean. Furthermore, augers degrade coatings and toppings, and are dangerous.

A breading machine was available from A. K. Robins and Company, Baltimore, Md. The machine was marketed as the Robins Vibro Batter and Breading Machine. As shown in FIG. 1546-5 of the product literature, the vibrator was mounted directly to the coating pan. The coating pan was mounted to a frame using springs. The frame was mounted to the floor and was operated at a very high amplitude and low frequency.

The present invention overcomes at least some of the disadvantages associated with the prior machines by providing an excited frame and pan assembly capable of dramatically improved coating of a wide range of food items at relatively high frequency and low amplitude.

The present invention overcomes at least some of the disadvantages associated with the prior machines by providing